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ABSTRACT

Trade and industrial education (T&I) has been using performance-based instructional systems long before competency-based education (CBE) emerged as a creative innovation in other subject areas. Allen devised the forerunner of the present CBE system in 1917 by carefully plotting competencies and delineating job analyses from these, and Fryklund's work around 1946 helped lay the foundation for compiling and teaching from sequentially ordered task lists. After examining the standard cumulative series of T&I job sheets in terms of the three essential components of the contemporary performance objective (condition, performance, and standard), one realizes that what is known today as the performance objective has by and large been addressed quite adequately in T&I over the years. This leads one to wonder why so many state departments of education and local administrators have required T&I teachers to spend endless hours rewriting existing curricula to include formal performance objectives. Not only does using a sequentially ordered competency list with a matched series of job sheets that include all the elements of the performance objective eliminate needless paperwork, but it also results in the following benefits: procedural steps would be available for the student, safety precautions would be listed along with steps in given activities, illustrations would be placed where needed, and special notes could be placed where tricky or difficult manipulations occur. (MN)

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DO WE REALLY NEED PERFORMANCE OBJECTIVES?

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Competency Based Education (CBE) emerged as a creative innovation over a decade ago. The performance objective evolved as a central component of the system. Subsequently, there has been a wholesale effort by local and state leaders to implement the rewriting of curricula based upon carefully formulated lists of performance objectives.

Perspective

For over forty years, Trade and Industrial (T & I) Education has addressed the concepts of (1) listing student jobs (competencies) on master lists, (2) recording student achievement, (3) assessing the conditions required for job completion, (4) identifying the performance (task) and (5) assessing standards of student achievement.

Because of the complexities inherent in T & I instruction, performance based systems were developed many years ago out of the sheer necessity to provide for efficient T & I

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laboratory management. The older systems, although varying considerably in terminology and format, not only included all of the ingredients of the contemporary performance objective but also most of what is conceived of as contemporary CBE today.

Charles Allen (1917) devised the forerunner of our present CBE system by carefully plotting competencies and delineating detailed job analyses from these competencies. His work was limited to industrial plant training, however, and his concept did not receive wide acclaim outside of the industrial sector.

Verne Fryklund (1946) is credited with perfecting a competency based system in the military and later bringing it to public schools. He broke occupational training programs down into blocks (units), jobs (tasks), doing lesson titles, knowing lesson titles, steps (topics) and keypoints (sub-steps). Because of the leadership provided by strategists such as Allen, Fryklund and others who saw the need for a systematic approach to

teaching laboratory subjects, T & I teachers were among the first to compile and teach from sequentially organized task lists. These lists, called progress charts, job lists, job performance check lists and various other names were essentially what is known as CBE competency lists today.

An integral part of the original T & I system was the job sheet which included (1) tools, materials, equipment, reference sources and time criteria (conditions), (2) the job to be performed (performance) and (3) an evaluation checklist or statement (standard). These job sheets were given to students for each major job on the competency list. Essentially, all of the ingredients of the modern performance objective plus many other features, i.e, procedural steps, check points, cautions, special notes and diagrams were integrated into this document. Essentially, what is known today as the performance objective has been addressed quite adequately by T & I over the years through the use of a cumulative series of job (procedure) sheets.

Insert Fig. 1

Contemporary Versus Traditional

The contemporary performance objectives in use today may serve the needs of Business Education, Marketing Education and other areas where both conditions and evaluation are easily stated and are far less complex in nature than in T & I. It is not the intention of this writer to discuss the curriculum strategies of other vocational disciplines but rather to discuss the implications of contemporary CBE to the specific needs of T & I instructors.

Let us examine the three "sacred" components of the contemporary performance objective; (1) condition, (2) performance and (3) standard. It is rare to find a contemporary T & I performance objective with all of the real conditions properly identified. Because seven or eight lines

could be required to list all the conditions, particularly all of the tools and supplies needed, it is common to find manipulative performance objectives begin with such vague statements as "Given the tools and materials required...", or " Given a standard wrench set, other tools and materials needed...". Is this type of statement of any real value in specifying conditions, or is it simply an attempt to make the performance objective "fit" an existing system required by a locality or school district? Contrast this situation with the T & I job sheet where all tools, supplies, cutting speeds, time (if needed) and other work conditions are clearly spelled out so that the student is enabled to learn proper terminology as well as connect together all of the conditions comprising a specialized task.

Consider the second sacred component of the contemporary performance objective, the actual student performance. If the student competency list has been developed completely and sequentially the "performance" aspect of

the performance objective becomes simply a matter of transferring a statement such as "Build 4" all stretcher wall" from the student competency list and incorporating it into the performance objective. Fig. 2. Furthermore,

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Insert Figure 2

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the corresponding job sheet should bear the same title. Why then the redundancy of part two of the performance objective? Is there really any reason for listing the performance on three separate documents?

If jobs are broken down into operations for teaching purposes, then the operation sheet title is a statement of required student performance for that segment of a larger whole. See Fig. 3.

Insert Figure 3

Even worse is the problem of deficient standards found for many performance objectives. Most T & I psychomotor tasks

require some sort of a rating scale, which includes quality, procedure and time (optional) to accurately measure all of the factors which should be observed by the teacher. Because it would be absurd to write an 8, 12 or 16 line standard it has become common to find meaningless short cuts in the standards of performance obectives such as "to please the patron", "so engine runs smoothly", "according to manufacturer's specifications", "so disc is attached securely" and a host of other similar ambiguities. Such short cuts, of course, defeat the whole idea of true competency evaluation. The sole purpose, once again of such ambiguity in writing standards is for the teacher to devise some academically acceptable way of "fitting" the program to match a required CBE system in the locality.

On the other hand, a good T & I job sheet will include a listing of the main criteria to be evaluated along with a critical (minimal passing) score. On very complex tasks a rating scale may be attached to the job sheet. (Fig. 1). When evaluation is similar for

several jobs it is possible to place a scale on the student competency list. See Figure 2. In any case, however, students will know in advance exactly how they will be evaluated.

New Directions

Thus far it has been established that a good job sheet states the (1) conditions, (2) performance, and (3) standard in a far more direct and practical way than does the performance objective. Why then have State Departments of Education and local administrators required T & I teachers to spend endless hours in rewriting their curriculum? Is there really anything wrong with simply utilizing a sequentially ordered competency list along with a matched series of job sheets which include all the elements of the performance objective?

If this practice were followed, not only would needless work be eliminated but several bonuses would be resultant, namely:

1. Procedural steps would be available for the student.

2. Safety precautions are listed with steps.
3. Illustrations are placed where needed.
4. Special "notes" are placed where tricky or difficult manipulations occur.

Furthermore, if job sheets are issued to students on a regular basis and are kept in a notebook as reference materials, a complete record of all job procedures is available at the end of the school year.

Implications for Change

This is not a plea to move back to the traditional but rather to point out that T & I has long utilized what is viewed today as a contemporary system. Furthermore, T & I has never gained proper recognition for this achievement although documentation is readily available.

It is well recognized that T & I personnel have not moved into educational leadership positions in proper portion to the numbers of T & I programs in the total vocational

education field. Part of this phenomenon can be attributed to (1) the large percentage of non-degree teachers employed in the T & I field, and (2) a slow start in establishing a collegiate ladder which would enable T & I teachers to qualify for the type of leadership positions where they can influence and temper change. Because there has always been a paucity of T & I people involved in the planning process, curriculum innovation found its way into the hands of those employed in other vocational disciplines who were unfamiliar with the curriculum heritage of T & I.

It is interesting to observe that relatively few vocational administrators or state department of education curriculum specialists have bonafide T & I backgrounds or know even the rudiments of T & I curriculum, either past or present. Most of the aforementioned group which this author has interviewed were of the opinion that CBE was a recent, creative and earthshaking concept--which they took the credit for discovering.

In reality it appears that the only profound vocational education curriculum innovations that this author has been able to document are terminology and format changes. The jobs have now become tasks/competencies; operations have become procedural steps or enabling objectives, blocks have become units, divisions or duty areas; the proficiency level has become the standard. At least 15 CBE formats are in use, all of them appearing to be equally effective; but adding to, rather than subtracting from the confusion of implementing a CBE program which is suitable for all occupational areas. It is no surprise that T & I teachers are utterly confused with the constant terminology and format change being required by over-zealous curriculum specialists.

It appears that T & I should receive long-overdue credit for its contribution as a pioneer in the CBE field and be allowed to continue its quest for practical curriculum management. For many T & I teachers performance objectives serve the purposes of

(1) preparing for accreditation and (2) appeasing those who advocate curriculum format conformity. It also is evident that performance objectives, as presently conceived, do little if anything to enhance the T & I job sheet approach to CBE.

Some conclusions which can be drawn from this discussion are:

1. Competency based systems existed in industrial training programs as early as 1917 and were improved on for military use in subsequent years.
2. T & I, building on industry and military programs, pioneered in developing a practical type of CBE in public school programs decades before other disciplines saw a need for CBE.
3. The T & I job sheet (procedure sheet) contains all of the ingredients of a performance objectives, plus procedural steps, safety precautions, illustrations and checkpoints.
4. Redundancy and much additional paper work occurs when T & I teachers are required to "make performance objectives" from existing

job sheets. When this is done, the mode and effectiveness of teaching will probably remain constant. Only the supporting written materials will change.

5. Changes in terminology and format of CBE have created the illusion of CBE as a new creative concept in vocational education.

6. Teachers are often required to construct performance objectives to "fit" an existing standard format developed by a local or state agency. Hence the work involved often become an end in itself.

7. Because of a need for brevity, the complete conditions required for job completion are seldom listed in a contemporary performance objective.

8. The performance component of a performance objective is often the same as a single task found on the existing student competency list.

9. The standard for many T & I jobs, if correctly developed, is far too long to include as part of the performance objective and is best included as a performance rating scale on the job sheet.

10. Because of its complex nature, T & I, has out of sheer necessity, developed a practical, time effective and time-tested system which minimizes redundancy and needless paperwork.

11. T & I teachers who have planned an adequate competency based approach should not be required to rewrite their curricula for the sake of compliance with an existing division or state-wide contemporary format.

12. T & I personnel have been practicing contemporary CBE for many years but have never been given credit for this rather outstanding achievement.

13. T & I has been slow in implementing a collegiate ladder which would enable T & I to assume the leadership for its own destiny. More seasoned T & I people are needed in State Department of Education curriculum centers and in other curriculum leadership positions.

JOB SHEET NO. 2 -1
Build a 4" All Stretcher Wall

OBJECTIVE

To acquire the skills of plumbing and leveling a short 4" all - stretcher wall.

TOOLS REQUIRED

Trowel, 48" level, 18" level, convex jointer, brick set hammer, line, line blocks, brick mason's brush, mortar board.

PROCEDURE

1. Lay out dry, 6 brick in a straight line to a straight-edge. Use the flat of the fore-finger as a spacer between the brick.

2. Bed up in mortar brick #1 and #2 as shown on the first course plan on the blueprint, before removing the remainder of the brick. Level with a plumb rule.

3. Stretch a mason line from #1 and #2 brick and run out the balance of the wall.
   Caution: Wear safety glasses when cutting bats.

4. Lay up brick #1 (in the elevation) which is a stretcher and then #2, a bat with the finished end on the face of the wall. Lay up #3 brick on the 3rd course at both ends as shown on face of wall. Plumb and level, corner to corner. Stretch a line and lay up and level wall.
   Check Point: See your instructor for checking.

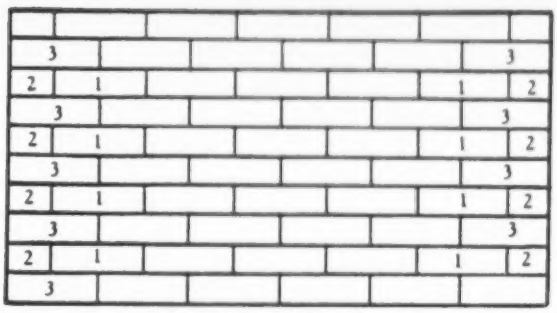
5. Continue to lay up the leads as shown on the elevation. Plumb each brick as laid on the lead. Run up to 11 courses.

6. Have the brick pile and mortar tub at least 2'-0" away from the job for working space.
   Note: Keep the mortar from splashing on the job and have tools clean at all times.

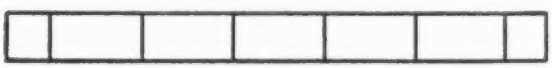
Fig 1

JOB SHEET NO.2-1 (Continued)

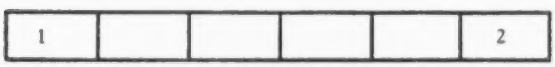
4 " ALL STRETCHER WALL



FRONT ELEVATION



2nd, 4th, 6th, 8th, and 10th course plan



1st, 3rd, 5th, 7th, and 9th course plan

EVALUATION		
Critical Score 85	Points	
	Poss.	Earn.
Height	15	
Plumb	15	
Level	15	
Square & Range	10	
Full Joints	10	
Production	10	
Manipulation	10	
Neatness (cuts, strk'g & jnt'g)	15	
Total	100	

Fig. 1 (Continued)

FIGURE 2

BRICK MASONRY I COMPETENCIES

Name _____

Class _____

KEY TO GRADING: 5 = Excellent 95-100 4= Good 88-94 3= Ave. 87-81 2= Poor 80-75 1= F 74-0

			20 points	50 points	20 points	10 points	100 points
			NEATNESS	UNIFORMITY	JOB PERFORMANCE	INDUSTRY	GRADE
			1 Appearance 2 Tool joints 3 Correct Design 4 Properly Mix 5 Correct Proportion	Level Plumb Straight Edge Height Coursing Square	Poor Fair Average Good Excellent	Poor Fair Average Good Excellent	LETTER / NUMBER
			1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	
Mortar	1-1-4	Mix Mortar					
	1-5	Spread Mortar					
Walls & Corners	2-1	Build a 4" all-stretcher wall					
	2-2	Build 4" brick wall w/jambs					
	2-3	Build 4" brick rack-back lead					
	2-4	4" brick corner r.b.					
	2-5	4" brick angle r.b.					
	2-6	8" return corner r.b.					
	2-7	8" brick common bond wall					
	2-8	8" brick corner common wall					
	2-9	8" flemish bond wall					
	2-10	8" flemish corner					
	2-11	8" block wall					
	2-12	8" block corner					
	2-13	6" block wall w/jambs					
	2-14	6" block corner w/13 5/8" cut					
	2-15	4" block wall					
	2-16	4" block corner w/11 5/8" starter					
	2-17	12" block corner w/11 5/8" starter					
	2-18	12" block corner w/8x 8x16" & 4" plug					
	2-19	Intersecting block wall					
Fireplace Chimney Flue	3-1	Fireplace complete 36"					
	3-2	Circulating fireplace (enc. w/brick)					
	3-3	Single flue chimney(block)					
	3-4	Single flue chimney(brick)					

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FIGURE 3.

LARGE JOBS SHOULD BE BROKEN DOWN INTO OPERATIONS FOR INSTRUCTIONAL PURPOSES

MACHINE SHOP JOB/OPERATION ANALYSIS

JOB:CROSS PEEN HAMMER

Operations:

1. Make a layout
2. File a surface
3. Polish a surface
4. Drill a 3/8 hole
5. Countersink for screws
6. Counterbore a hole
* 7. Turn and taper a work piece
8. Face a work piece
* 9. Tape 3/8" hole
*10. Thread a 3/8" hole
*11. Cut angles on shaper
12. Cut with power hack saw
13. Grind a surface

* Operation sheets utilized